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Specifications for Major Program

Name of School (Program) [School of Applied Biological Science comprises]

Program name (Japanese)	È#Ø#Õ"@&É Û z S 7 É ß ¢ Û Ò
(English)	Fisheries Biology Program

1>,   Degree to be obtained: Bachelor of Agriculture

2>,   Overview

In the five major programs of the School of Applied Biological Science (Integrated Ecoscience Program, Fisheries Biology Program, Animal Science Program, Food Science Program, and Applied Molecular and Cellular Biology Program), the aim is to enable students to acquire a wide range of knowledge and wisdom in the realms of natural and social sciences related to applied biology. Specifically, we provide education that allows students to q acquire basic knowledge regarding biotic resources and food production, biotechnology, and protection of the biological environment; r gain experience in field science; s understand bioethics and engineering ethics; and t obtain capabilities in foreign languages such as English and in data processing.

In the Fisheries Biology Program, education is provided by faculty members belonging to seven educational subjects (biology of aquatic resources, fish neurobiology, aquaculture, benthos ecology, aquatic pathology, aquatic biochemistry, and the Takehara Marine Science Station) enabling students to acquire basic knowledge and skills related to physiology; pathology; biochemistry; molecules; ecology; ethology; the use of fish, aquatic invertebrates, and seaweed as resources; and techniques for the cultivation of aquatic organisms. Students are also given the education necessary to obtain basic knowledge regarding the problems related to the subjects mentioned above, as well as a broad perspective on the international challenges in these areas. In addition, they are taught to develop the ability to independently plan and execute studies in order to find solutions to the problems that they encounter in the field of the production and study of aquatic biological resources, to analyze and organize the materials they collect, and to publish and discuss their results orally and in writing.

The students educated in the program are expected to go on to graduate school, or to become researchers and specialists with an international outlook working in institutions such as the public office for agriculture and fisheries, or in business fields related to foods and chemical/pharmaceutical products.

3>,   Diploma policy (policy for awarding degrees and goal of the program)

The Fisheries Biology Program aims to develop professionals who are capable of working as specialists in a company or corporation that is engaged in such activities as food production, recycling, or the effective use of resources in the hydrosphere. As such, in this program, the degree of bachelor of agriculture will be awarded to students who have earned the required credits and certification to satisfy the specified level of achievement, passed the examination that is administered by the School of Applied Biological Science, and acquired the following abilities.

Through the liberal arts education, the student is required to acquire:

1.   The ability to study independently, collecting, analyzing, and criticizing data, together with the willingness to demonstrate of the use of this ability;

2.   Insight from a broad perspective into the essentials and background of phenomena, and the linguistic ability and interest in peace that are required for a citizen of the world;

3.   The ability to identify a problem based on broad knowledge, to integrate findings to establish a "knowledge system" that is truly useful for problem solving, and to examine phenomena from a comprehensive perspective; and

4.   General and basic knowledge of science that enables the student to develop the

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○ Overview

  Contents of the graduation research varies with the laboratory to which the student is allocated and the topic which he/she focuses on. Some research mainly consists of field studies, while other research consists of only indoor experiments. The themes for graduation research in each laboratory are explained through the focused guidance and explanation given by each teacher. In graduation research, students learn the fundamental spirit and ethic required for research activities, establish a plan for the research, study the methods needed for the research and experiments, and carry out the research under the instruction of their mentor. Furthermore, students review the results obtained in the research and identify targets for further research. Students acquire an interest in research activities while gaining experience in a series of research processes, and prepare their graduation thesis by the specified date. Also, students present the results of their research at the graduation thesis presentation assembly, which is held for the whole of the major program.

  ○ Student allocation method and timing

1. Students are allocated to a laboratory in the second semester of the third year.
2. Students are allocated to a laboratory under the guidance of the tutor in charge, according to the allocation method stipulated for the Fisheries Biology Course.

  In our program, guidance is provided by the tutor in charge to allow students to positively choose the laboratory to which he/she is to be allocated. At first, the tutor explains to students in the second year the specialties of each faculty member. Then students are instructed to attend the presentation assembly for graduation theses and master's theses, in order to understand the details of the research undertaken by each faculty member. Students visit laboratories when they are in the first semester of the third year, to learn the details of the graduation thesis and situation in the laboratory.

  The tutor hands out materials that describe topics for the graduation thesis and the limit for the number of students to be allocated to each laboratory, and then considers each student's wishes. In principle, assignment is coordinated by the tutor in charge, with the agreement of the faculty members who are going to teach the students.

10. Responsibility

(1) Responsibility for PDCA (plan, do, check, and act) cycle

1. The education affairs committee of school and the faculty members who provide the lectures are engaged in the "plan" and "do" processes.

2. Each course has responsibility for planning and executing its major program. A chief faculty member is designated as the supervisor of the course.

3. The education affairs committee of the school exercises control over the major programs provided by the school.

4. The education affairs committee of the school consists of five members who are elected from each course, and a chairman who is chosen by the school.

5. The education reform promotion committee is engaged in the process of "check."

6. The education reform promotion committee consists of five members who are elected from each course, a chairman who is chosen by the school, the chairman of the education affairs committee of the school, and an assistant chief of the graduate course.

7. The education reform promotion committee reviews and evaluates the major programs provided in each course, reports the results to the education affairs committee of the school and the courses, and provides advice and recommendations.

8. The course committee that takes the responsibility for execution of the major program is engaged in the process of "act."

9. The course committee and the education affairs committee of the school prepare and execute a plan for improvement taking into consideration the report, advice, and recommendations that are provided by the education reform promotion committee after the "check" process.

The course committee, the education affairs committee of the school, and the education reform promotion committee cooperate with one another to execute their roles with responsibility in the "plan", "do", "check", and "act"cycle in order to improve the education provided by the school.

(2) Evaluation of program

(a) Viewpoint for evaluation of program

The Fisheries Biology Program is evaluated from the viewpoints of "educational effectiveness" and "social effectiveness."

The "educational effectiveness" is evaluated by the effect of the implementation of the program on the educational achievement of students.

The "social effectiveness" is evaluated by the effect of educational achievement in the program on society.

(b) Evaluation method

In the Fisheries Biology Program, achievement in the program is evaluated from the perspectives described above for students in the second semester of the fourth year.

For "educational effectiveness", the results and achievements of the students who took the program are evaluated comprehensively by the group of faculty members who are engaged in the execution of the program. Also, the level of achievement of all the students is evaluated and reviewed.

"Social effectiveness" is evaluated based on such things as the rate of employment in corporations that have a close connection with the contents of this program, and the pass rate in public servant examinations. We regularly request a member of human resources staff from a company that mainly employs students from this program to evaluate the program. In addition to this, we request graduates of this program to evaluate their own achievement and that of the program. The staff working in companies and other graduates are requested to provide evaluation and advice regarding whether the class subjects and their contents in this program had a positive effect on their social activities, whether the contents of the classes appropriately corresponded to changes in science, technology, and society, and any additional class subject that may be required in the future.

(c) Policy and method for feedback to students

The education reform promotion committee regularly conducts surveys and interviews for students to review and evaluate the program, improve the contents of the program, and provide advice and recommendations for improvement.

○ Table of Registration Standards for Major Programs in the Fisheries Biology Course
(Specialized Subjects)

Type	Subject type	Required No. of credits	Class subjects	No. of credits	1st grade Spring	1st grade Fall	2nd grade Spring	2nd grade Fall	3rd grade Spring	3rd grade Fall	4th grade Spring	4th grade Fall
Specialized Education Subjects	Specialized Subjects		Introduction to Fisheries Biology	2				○				
			Aquatic Animal Physiology	2				○				
			Fish Pathology	2				○				
			Fisheries Ecology	2				○				
			Aquatic Biochemistry	2				○				
			Marine Invertebrate Zoology	2				○				
			Laboratory M at e$\mathbb{Z}$					○				
				1				○				
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				1					○			
				1					○			
			Laboratory Work in Aquatic Botany	1					○			
			Field Work on Training Vessel	2					○			
			Graduation Thesis	6							○	
			Required subjects: 27 total credits									

			Subject	Credits							
			Aquatic Molecular Biology	2				○			
			Introduction to International Fishery	2				○			
			Behavioral Ecology of Fish	2				○			
			Benthic Ecology	2				○			
			Coastal Fisheries Ecology	2				○			
			Conservation Sciences of Marine Algal Resources	2				○			
			Specialized Practical Work in Marine Biology	1						○	

Elective or required subjects: 10 credits are required from a total of 13 credits.
(Credits obtained beyond the 10 credits shall be regarded as credits obtained in elective subjects)

Subject	Credits								
Plankton Ecology	2				○				
Seafood Chemistry and Biochemistry	2				○				
Nutrition	2				○				
Biological Oceanography	2					○			
Marine Environmental Science	2						○		
Laboratory and Field Works in Marine Biology	1						○		
Immunobiology	2						○		
Marine Bioresources Chemistry	2						○		
Food Production Management	2						○		
Laboratory and Field Works of Environmental Biology	1							○	

Elective subjects: At least **19** credits must be obtained.

・Students are required to take subjects from elective subjects of the Program appearing in the Table.

・Specialized subjects from other Applied Biological Science programs outside the table can be included in the elective subjects.

・Up to **12** credits obtained from specialized subjects at another School and from subjects offered by the AIMS Program completed at the dispatch destination can be included in the credits required for graduation.

・Credits obtained from Liberal Arts Education Subjects and subjects related to the teaching profession cannot be included in the credits required for graduation.

	124	

[No. of credits required for graduation]

124 credits (Liberal Arts Education Subjects: 44 credits + Basic Specialized Subjects: 24 credits + Specialized Subjects: 56 credits)

Academic achievements of Fisheries Biology Program

Relationships between the evaluation items and evaluation criteria

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Abilities and Skills	(1)	To acquire abilities of basic communication, information processing, and physical activity.	To have excellent abilities concerning the following elements: basic communication, information processing, and physical activity.	To have adequate abilities concerning the following elements: basic communication, information processing, and physical activity.	To have basic abilities concerning the following elements: basic communication, information processing, and physical activity.
	(2)	To acquire abilities and skills of basic experiment needed to learn a specialty.	To have adequate abilities and skills of basic experiment, and being able to independently advance.	To have adequate abilities and skills of basic experiment, and being able to do according to the directions.	To have rough abilities and skills of basic experiment, and being able to do assistance.
	(3)	To acquire skills for analyzing and evaluating various characteristics of aquatic organisms and hydrospheric environment.	Being able to independently analyze and evaluate various characteristics of aquatic organisms and hydrospheric environment.	Being able to analyze and evaluate various characteristics of aquatic organisms and hydrospheric environment according to the directions.	Being able to roughly analyze and evaluate various characteristics of aquatic organisms and hydrospheric environment according to the directions.
	(4)	To acquire basic skills and analyzing method for rearing aquatic organisms.	To have adequate basic skills and analyzing method for rearing aquatic organisms, and being able to independently advance.	To have basic skills and analyzing method for rearing aquatic organisms, and being able to do according to the directions.	To have rough basic skills and analyzing method for rearing aquatic organisms, and being able to do assistance.
	(5)	To acquire skills for analyzing and evaluating the role of fishery in human life and the effect on hydrospheric environment.	Being able to independently analyze and evaluate the role of fishery in human life and the effect on hydrospheric environment.	Being able to analyze and evaluate the role of fishery in human life and the effect on hydrospheric environment according to the directions	Being able to roughly analyze and evaluate the role of fishery in human life and the effect on hydrospheric environment according to the directions
	(6)	With regard to aquatic organisms, to be acquire reading and communication abilities in English.	To have very high reading comprehension in English, which is able to read specific academic articles, and acquiring sufficiently and deeply international communication abilities.	To have high reading comprehension in English, which is able to adequately read specific academic articles, and acquiring sufficiently and deeply international communication abilities.	'To have reading comprehensions in English, which is able to partially read specific academic articles, and acquiring sufficiently and deeply international communication abilities.
Comprehensive Abilities	(1)	With regard to specific phenomena of aquatic organisms, to be able to find targets, summarize opinions, deliver presentations or reports logically, and answer questions	To have excellent utilize abilities and skills concerning the following elements: to set up a target, information processing, summarizing statistical data, logical expression and responsive communication.	To have adequate utilize abilities and skills concerning the following elements: to set up a target, information processing, summarizing statistical data, logical expression and responsive communication.	To have basic utilize abilities and skills concerning the following elements: to set up a target, information processing, summarizing statistical data, logical expression and responsive communication.

Placement of the Liberal Arts Education in the Major Program

The liberal arts education in this Program plays the role of creating an academic foundation for specialized education to enable students to develop a voluntary and independent learning attitude; to cultivate scientific thinking based on their ability to gather information, their analytical capacity, and critical powers; to gain deep insight into the nature of and

Relationships between the evaluation items and class subjects

					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items
Liberal Arts Education	Introductory Seminar for Freshmen	2	Required	semester	80	1	20	1	100
Liberal Arts Education	Peace Science Courses	2	Elective/required	1-2semester	80				
Liberal Arts Education	Basic Calculus/Elements of	2	Required	semester			100	1	100
Liberal Arts Education	Organic Chemistry	2	Required	semester			100	1	100
Liberal Arts Education	Species Biology	2	Required	semester			100	1	100
Liberal Arts Education	Cell Science	2	Required	semester			100	1	100
Liberal Arts Education	General Chemistry/Basic Chemistry	2	Required	semester			100		

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Knowledge and Understanding (1) Subj	(1) Item	(2) Subj	(2) Item	(3) Subj	(3) Item	(4) Subj	(4) Item	(5) Subj	(5) Item	(6) Subj	(6) Item	Abilities and Skills (1) Subj	(1) Item	(2) Subj	(2) Item	(3) Subj	(3) Item	(4) Subj	(4) Item	(5) Subj	(5) Item	(6) Subj	(6) Item	Comprehensive Abilities (1) Subj	(1) Item	Total weighted values of evaluation items in the
Specialized Education	Introduction to Fisheries Biology	2	Required	4semester					50	1	25	1	25	1																	100
Specialized Education	Aquatic Animal Physiology	2	Required	4semester					50	1			50	1																	100
Specialized Education	Aquaculture	2	Required	5semester					50	1	25	1	25	1																	100
Specialized Education	Fish Pathology	2	Required	4semester					50	1			50	1																	100
Specialized Education	Fisheries Ecology	2	Elective/required	4semester					50	1					50	1															100
Specialized Education	Aquatic Biochemistry	2	Elective/required	4semester					50	1			50	1																	100
Specialized Education	Marine Invertebrate Zoology	2	Required	4semester					50	1					50	1															100
Specialized Education	Laboratory Work in Applied Marine	1	Elective/required	4semester																	50	1	50	1							100
Specialized Education	Laboratory Work in Aquatic Biochemistry	1	Elective/required	4semester																	50	1	50	1							100
Specialized Education	Laboratory Work in Applied Marine	1	Required	5semester																	50	1	50	1							100
Specialized Education	Field Works and Experiments of Marine Fisheries	1	Elective/required	5semester																	50	1	25	1	25	1					100
Specialized Education	Laboratory Work in Aquatic Botany	1	Required	5semester																	50	1	50	1							100
Specialized Education	Field Work on Training Vessel	2	Required	5semester																	50	1			50	1					100
Specialized Education	Reading of Foreign Literature	2	Required	5semester																							80	1	20	1	100
Specialized Education	Graduation Thesis	6	Required	6-8semester																							20	1	80	1	100
Specialized Education	Aquatic Molecular Biology	2	Required	5semester					50	1			50	1																	100
Specialized Education	Introduction to International	2	Elective/required	5semester							100	1																			100
Specialized Education	Behavioral Ecology of Fish	2	Elective/required	5semester					50	1					50	1															100
Specialized Education	Benthic Ecology	2	Elective/required	5semester					50	1					50	1															100
Specialized Education	Coastal Fisheries Ecology	2	Elective/required	5semester							50	1			50	1															100
Specialized Education	Conservation Sciences of Marine	2	Elective/required	5semester							50	1			50	1															100
Specialized Education	Specialized Practical Work in Marine	1	Elective/required	7semester																	50	1			50	1					100

Curriculum Map of Fisheries Biology Program

Academic achievements	1st grade		2nd grade		3rd grade		4th grade	
Evaluation items	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester

Knowledge and Understanding

To aquire abilities for considering academically and comprehensively, and examing and acting from a broad perspective required for find solutions to the problems relating a specialty.

Spring semester (1st)	Fall semester (1st)	Spring semester (2nd)	Fall semester (2nd)	Spring semester (3rd)
Introductory Seminar for Freshmen(◎)				
Peace Science Courses(◎)				
Introduction to University Education(◎)				
Foreign Languages(◎)	Foreign Languages(◎)	Foreign Languages(◎)	Foreign Languages(〇)	
Information Courses(〇)				
Area Courses(〇)				
Health and Sports Courses(〇)				
Basic Calculus·Elements of Calculus(◎)	Organic Chemistry(◎)	Environmental Sciences for Bioproduction(◎)		Public Hygiene(〇)
Species Biology(◎)	Cell Science(◎)	Basic Molecular Biology(◎)		
General Chemistry·Fundamental Chemistry(◎)		Laboratory Work in General Biology Ⅰ, Ⅱ(◎)		
Experimental Methods and Laboratory Work in Physics(〇)		Basic Experiments in Chemistry(◎)		
Experimental Methods and Laboratory Work in Chemistry(〇)		Laboratory Work in General Physics(◎)		
Experimental Methods and Laboratory Work in Biology(〇)		Ecology(〇)		
Introduction to Applied Biological Sciences(◎)	Introduction to Biochemistry(◎)	Animal Physiology(〇)		
Introduction to Microbiology(〇)	Agricultural Production Resources(◎)	Genetics(〇)		
	Physics for Applied Biological Science(◎)	Introduction to Biological Science of Animal Production and Fishery(〇)		
	Ethics of Science and Technology(◎)	Introduction to Plant Biological Science(〇)		
	Seminer in Field Science(〇)	Biological Statistics(〇)		

To comprehensively understand the morphological, ecological, physiological, pathological, biochemical and genetical characteristics for various aquatic organisms..

Fall semester (2nd)	Spring semester (3rd)
Introduction to Fisheries Biology (◎)	Aquaculture (◎)
Aquatic Animal Physiology (◎)	Aquatic Molecular Biology (〇)
Fish Pathology (◎)	Behavioral Ecology of Fish (〇)
Fisheries Ecology (◎)	Benthic Ecology (〇)
Aquatic Biochemistry (◎)	
Marine Invertebrate Zoology (◎)	

To understand the management, cultivation and product utilization of aquatic resources, and the economic trend of fisheries.

Fall semester (2nd)	Spring semester (3rd)
Introduction to Fisheries Biology (◎)	Aquaculture (◎)
	Introduction to International Fishery (〇)
	Coastal Fisheries Ecology (〇)
	Conservation Sciences of Marine Algal Resources (〇)

To understand the physiological, pathological, biochemical and genetical backgrounds required for the management and culivation of aquatic resources.

Fall semester (2nd)	Spring semester (3rd)
Introduction to Fisheries Biology (◎)	Aquaculture (◎)
Aquatic Animal Physiology (◎)	Aquatic Molecular Biology (〇)
Fish Pathology (◎)	
Aquatic Biochemistry (◎)	

To understand the morphology and ecology of aquatic organisms in relation to hydrospheric environment.

Fall semester (2nd)	Spring semester (3rd)
Fisheries Ecology (◎)	Behavioral Ecology of Fish (〇)
Marine Invertebrate Zoology (◎)	Benthic Ecology (〇)
	Coastal Fisheries Ecology (〇)
	Conservation Sciences of Marine Algal Resources (〇)

.To acquire abilities of basic communication, information processing, and physical activity.

Spring semester (1st)	Fall semester (1st)	Spring semester (2nd)	Fall semester (2nd)
Introductory Seminar for Freshmen(◎)			
Peace Science Courses(〇)			
Intergrated Courses(〇)			
Foreign Languages(◎)	Foreign Languages(◎)	Foreign Languages(◎)	Foreign Languages(〇)
Information Courses(〇)			
Area Courses(〇)			

Academic achievements		1st grade		2nd grade		3rd grade		4th grade	
Evaluation items		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Abilities and Skills		Health and Sports Courses (○)							
	To acquire abilities and skills of basic experiment needed to learn a specialty.	Experimental Methods and Laboratory Work in Physics（○）		Laboratory Work in General Biology Ⅰ, Ⅱ（◎）					
		Experimental Methods and Laboratory Work in Chemistry（○）		Basic Experiments in Chemistry（◎）					
		Experimental Methods and Laboratory Work in Biology（○）		Laboratory Work in General Physics（◎）					
	To acquire skills for analyzing and evaluating various characteristics of aquatic organisms and hydrospheric environment.			Laboratory Work in Applied Marine Biology Ⅰ（◎）		Laboratory Work in Applied Marine Biology Ⅱ（◎）	Laboratory and Field Works in Marine Biology（○）	Laboratory and Field Works of Environmental Biology（○）	
				Laboratory Work in Aquatic Biochemistry（◎）		Field Works and Experiments of Marine Fisheries Science in "Sato Umi"（the Seto Inland Sea）（◎）		Specialized Practical Work in Marine Biology（○）	
						Laboratory Work in Aquatic Botany（◎）			
						Field Work on Training Vessel（◎）			
	To acquire basic skills and analyzing method for rearing aquatic organisms.			Laboratory Work in Applied Marine Biology Ⅰ（◎）		Laboratory Work in Applied Marine Biology Ⅱ（◎）			
				Laboratory Work in Aquatic Biochemistry（◎）		Field Works and Experiments of Marine Fisheries Science in "Sato Umi"（the Seto Inland Sea）（◎）			
						Laboratory Work in Aquatic Botany（◎）			
	To acquire skills for analyzing and evaluating the role of fishery in human life and the effect on hydrospheric environment.					Field Works and Experiments of Marine Fisheries Science in "Sato Umi"（the Seto Inland Sea）（◎）		Specialized Practical Work in Marine Biology（○）	
						Field Work on Training Vessel（◎）			
	With regard to aquatic organisms, to be acquire reading and communication abilities in English.					Reading of Foreign Literature（◎）	Graduation Thesis（◎）		
Comprehensive	With regard to specific phenomena of aquatic organisms, to be able to find targets, summarize opinions, deliver presentations or reports logically, and answer questions.					Reading of Foreign Literature（◎）	Graduation Thesis（◎）		

Liberal Arts Education Subjects	Basic Specialized Subjects	Specialized Education Subjects	Graduation Thesis	（◎）Required　（○）Elective/required　（△）Free elective